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Date: March 14, 2002

Number of pages
including cover sheet: 10

To:

**Mr. Sung Pak
US PTO
Washington, D.C.**

Your Ref 09/643,333

Phone:

Fax No. *8-703-746-4747

From:

**NÉSTOR F. HO
3M AUSTIN CENTER
AUSTIN, TX 78726**

Our Ref: 55243USA3B.009

Phone: 512-984-7443

Fax No. 512-984-2020

Remarks: ☒ Urgent ☐ Acknowledge ☐ Reply ASAP ☐ Please Comment

Mr. Sung Pak,

Thank you for your call this morning. I am pleased to send you the following
Amendment via facsimile, per your request. Please note that we mailed this Amendment
on February 8, 2001. The document was received in the PTO on February 12, 2001, as
evidenced by the post card, a copy of which is attached.

Should you need anything additionally, please do not hesitate to contact me again.

Nestor F. Ho

DUPLICATE

Office of Intellectual Property Counsel
3M Innovative Properties Company
PO Box 33427
St. Paul, Minnesota 55133-3427
651/733 1500

PATENT

Docket No.

55243USA3B.009

Amendment Transmittal Letter

Commissioner for Patents
Washington, DC 20231

Inventor(s): Harry A. Loder and Duane T. Smith
Application No. 09/643,333
Filed: August 22, 2000
Title: OPTICAL FIBER CONNECTOR SYSTEM

Group Art Unit: Unknown
Examiner: Unknown

- ☒ Enclosed is an amendment in the above-identified application.
☒ The fee for this amendment is computed as follows:

Claims As Amended						
(1)	(2) Claims Remaining After Amendment	(3)	(4) Highest No. Previously Paid For	(5) Present Extra	(6) Rate	(7) Additional Fee
Total Claims	37	Minus	** 20	= 17	x \$18	= \$306.00
Independent Claims	7	Minus	*** 3	= 4	x \$80.	= \$320.00
Additional fee for filing one or more multiple dependent claims, if no such fee has been previously paid					\$270	\$
Total Additional Fee For This Amendment →						\$626.00

** If the "Highest No. Previously Paid For" in this space would be less than 20, write "20" in this space.

*** If the "Highest No. previously Paid For" in this space would be less than 3, write "3" in this space.

- ☒ Please charge to Deposit Account 13-3723 any fees under 37 CFR 1.16 and 1.17 which may be required during the entire pendency of this application. This authorization includes the fee for any extension of time under 37 CFR 1.136(a) that may be necessary. To the extent any such extension should become necessary it is hereby requested.

Registration Number	Telephone Number
39,460	512-984-7443
Date	
February 8, 2001	

Respectfully submitted,

Signature

Printed Name

Néstor F. Ho

Certificate of Mailing	
Pursuant to 37 CFR 1.8 I certify that this correspondence is being deposited on the date indicated below with the United States Postal Service as First Class Mail addressed to: Commissioner for Patents, Washington, DC 20231	
Date of Deposit	Signature
February 8, 2001	Tom Sanders
	Printed Name
	Tom Sanders

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Patent

Docket No: 55243USA3B.009

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Harry A. Loder and Duane T. Smith

Group Art Unit: Unknown

Serial No.: 09/643,333

Filed: August 22, 2000

Examiner: Unknown

For: OPTICAL FIBER CONNECTOR SYSTEM

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: Commissioner for Patents, Washington, DC 20231 on:

February 8, 2001

Date

Signature


Tom SandersSECOND PRELIMINARY AMENDMENTCommissioner for Patents
Washington, DC 20231

Dear Sir:

Please enter the following preliminary amendments to the above referenced patent application:

In the Claims:

Please delete claims 1-7.

Please add the following claims:

13. A connector system for connecting at least one optical fiber cable on a mateable substrate through a backplane, the optical fiber cable including a terminating ferrule, the longitudinal orientation of optical fibers within the terminating ferrule defining a longitudinal axis and a forward direction, the ferrule having a first longitudinal range of motion and a ferrule spring

element having a longitudinal ferrule spring force f_n , with n being the number of ferrule springs, the connector system comprising:

a substrate housing assembly mounted on the substrate including
at least one ferrule receiving feature for receiving the optical fiber ferrule, and
a substrate spring assembly, the substrate housing assembly having a second longitudinal range of motion, the substrate spring assembly biasing forward the housing assembly along the second longitudinal range of motion and having a longitudinal spring force h , wherein

$$1. \quad h > \sum_{n=1}^m f_n ;$$

a backplane housing assembly defining at least one longitudinal receiving cavity configured to mate with the ferrule receiving feature, the receiving cavity having a frontal opening along the first surface of the backplane and a rear opening along the second surface of the backplane, wherein when the substrate is placed in a mating position with respect to the backplane, the substrate spring assembly maintains the backplane housing and the substrate housing in housing mating positions with respect to each other.

14. The connector system of claim 13, wherein the substrate spring assembly comprises a first and a second laterally spaced suspension spring members, the first and second suspension spring members allowing a range of angular movement of the housing assembly with respect to the substrate.
15. The connector system of claim 13, wherein the spring assembly comprises a plurality of individual housing spring members exerting a plurality of longitudinal spring forces, wherein in the housing mating position the ferrules abut against respective opposing connecting ferrules, the summation of the forward longitudinal spring forces of the individual housing spring members is greater than the summation of the backward longitudinal spring forces exerted by the ferrule spring members on the opposing connecting ferrules.

16. The connector system of claim 13, wherein the substrate spring assembly allows for the housing assembly a measure of angular rotation with respect to the substrate, wherein the substrate spring assembly corrects a measure of angular misalignment between the substrate and the backplane to allow coupling of the backplane housing assembly and the substrate housing assembly.
17. The connector system of claim 13, the backplane housing assembly further including a frontal door covering the frontal opening.
18. The connector system of claim 13, the backplane housing assembly further including a rear door covering the rear opening.
19. The connector system of claim 17, wherein the door provides electromagnetic containment.
20. The connector system of claim 17, wherein the door automatically closes when the backplane housing assembly is not mated.
21. The connector system of claim 13, the substrate housing assembly comprising a plurality of stacked ferrule receiving features, the backplane housing assembly including a corresponding number of corresponding receiving cavities.
22. A connector system for connecting a plurality of optical fiber cables on a slidable card through a generally orthogonally disposed backplane, each optical fiber cable having a terminating ferrule, the longitudinal orientation of optical fibers within the terminating ferrule defining a longitudinal axis and a forward direction, each ferrule having a longitudinal range of motion with respect to the optical fiber cable and a forward biasing ferrule spring element having a longitudinal ferrule spring force, the optical connector system comprising:
a card housing assembly including
at least one ferrule receiving cavity for receiving the optical fiber ferrule, and
a spring assembly, wherein the spring assembly couples the card housing assembly to the card;

wherein the card housing assembly has a longitudinal range of motion, the spring assembly biasing the housing assembly along the second longitudinal range of motion in a forward direction and having a longitudinal housing spring force, wherein the summation of the forward longitudinal housing spring forces is greater than the summation of the backward longitudinal spring forces exerted by the ferrule spring elements.

23. A backplane connector assembly for making optical connections through a backplane, the connector assembly comprising

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a backplane housing defining at least one longitudinal receiving cavity through the backplane, the receiving cavity having a frontal opening along the front surface of the backplane member configured to receive a first optical connector and a rear opening along the back surface of the backplane member configured to receive a second optical connector;

a foldable frontal door at least partially covering the frontal opening; and

a foldable rear door at least partially covering the rear opening;

wherein the doors automatically close when an optical connector member is not placed in the respective opening, wherein the front door and the rear door operate independently from each other.

24. The backplane connector assembly of claim 22, wherein at least one of the doors includes an electrically conductive material and the door is electrically grounded.

25. The backplane connector assembly of claim 24, wherein the backplane housing includes a dielectric material and is not electrically conductive.

*Insufficient
Disclosure*

26. The backplane connector assembly of claim 22, wherein the backplane housing is electrically conductive and is electrically grounded and the doors are non electrically conductive.

27. The backplane connector assembly of claim 22, wherein the doors comprise a foldable spring design that folds into the opening when a connector is inserted into the opening.

- C'mt
28. The backplane connector assembly of claim 22, wherein the doors comprise a spring biased element coupled to a hinge element.
29. The backplane connector assembly of claim 22, wherein the backplane housing defines a plurality of linearly stacked receiving cavities.
30. The backplane connector assembly of claim 29, wherein the doors comprise pairs of spring biased element coupled to a hinge element, each spring biased element covering one opening.
31. The backplane connector assembly of claim 22, wherein the backplane housing includes frame features that assure a tight fit of the doors within the opening in a closed position.
-
32. A bend radius control member for controlling the bend radius of an optical fiber cable comprising a deformation resistant heat-shrunk outer jacket wrapped around the optical fiber cable, wherein the heat-shrunk outer jacket has a desired bend radius curvature.
33. A method for controlling the bend radius of at least a portion of an optical fiber cable having at least one optical fiber, the method comprising the steps of:
- providing a jacket of a heat shrinkable-material;
 - placing the jacket around the portion of the optical fiber cable;
 - bending the portion of the optical fiber cable at a desired bend angle; and
 - shrinking the jacket around the optical fiber cable by the application of heat
34. The method of claim 33, wherein the step of bending includes bending the portion of the optical fiber cable in at least two curves.
35. The method of claim 34, wherein the curves are in different planes.
36. The method of claim 33, the step of bending the optical fiber cable comprising the steps of:

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37 amended

providing a cable forming device having at least one mandrel, wherein the mandrel has a radius greater than a minimum bend radius for the optical fiber cable, and wrapping the portion of the optical fiber cable about the mandrel

37. The method of claim 36, the cable forming device including at least two mandrels, wherein the mandrels are attached to different phases of a support, and the cable is bent in an S-shape having two curves, the two curves being on different planes.

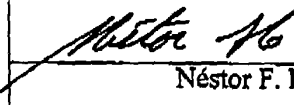
REMARKS

If there are any matters that may be resolved or clarified through a telephone interview, the Applicants' Attorney makes himself available at the telephone number listed below. Alternately, the Examiner may fax communications directly to the Applicants' Attorney at the facsimile number listed below.

The Applicants have included a Transmittal Letter detailing the fees for the additional claims and the authorization for the fees to be charged to the Assignee's Deposit Account No. 13-3723. The Applicants do not believe that any additional fees are necessary in relation with the filing of the present communication. If the Applicants are in error, the Applicants hereby authorize the charging of any additional necessary fees to 3M Innovative Properties Company Account Number 13-3723.

Respectfully submitted,

Registration Number 39,460	Telephone Number 512-984-7443
Date February 8, 2001	

By	
	Néstor F. Ho

Office of Intellectual Property Counsel
3M Innovative Properties Company
P.O. Box 33427
St. Paul, Minnesota 55133-3427
Facsimile: 512-984-2020

Application Of: Harry A. Loder and Duane T. Smith

Docket No.: 55243USA3B.009 Serial No.: 09/643,333

Title: OPTICAL FIBER CONNECTOR SYSTEM

Pages of Specification (including Claims and Abstract):

No. of Claims:

Sheets of Drawings:

☐ Declaration

☐ Assign.

☒ Certif. of Mailing

Amount charged to Deposit Account: \$626.00

Attorney (initials): NFH/s

Date: February 8, 2001

Express Mail No.: n/a

Enclosures: Amendment Transmittal Letter, Second Preliminary
Amendment and a Return Post Card

Abstract

Application Of: Harry A. Loder and Duane T. Smith

Docket No.: 55243USA3B.009 Serial No.: 09/643,333

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NESTOR F. HO

Abstract

